Title: Finding and Analyzing Weather Data Using the Internet

Link to Outcomes:

- **Problem Solving**   Students will solve problems involving means, medians, and modes.

- **Communication**   Students will discuss their findings with other students and present these results on activity sheets.

- **Reasoning**   Students will tabulate data and make conjectures based on the data.

- **Connections**   Students will observe connections between the use of the Internet and mathematics.

- **Statistics**   Students will compute means, medians, and modes using their data.

- **Technology**   Students will access and interact with the Internet using a computer.

- **Cooperation**   Students will work in groups to access information and work with the data.

Brief Overview:

In this unit, students will learn to use the Internet to locate weather data from different sources and to statistically analyze this data.

Grade/Level:

Grades 9-12

Duration:

This lesson is expected to take at least 2 to 3 days.

Prerequisite Knowledge:

The student must be familiar with basic algebra, the ability to construct a histogram, as well as the following concepts in statistical averaging:

- mean = the sum of the numbers divided by the number of items.
- median = the middle number if numbers are written smallest to largest.
- mode = the most common number.

Objectives:

Students will:

- identify Internet terms and addresses.
- do an Internet search to access various information.
- access weather data on the Internet and record on a data sheet.
- compute means, medians, and modes and answer questions regarding these.
- construct a histogram of weather data.
- construct a flow chart and write a structured BASIC program to produce a frequency distribution using weather data.

Materials/Resources/Printed Materials:

- Computer and Internet access
- Information Superhighway - Student Resource #1
- Searching the Internet - Student Resource #2
- Student activity sheets - Student Resources #3 - #6

Development/Procedures:

Distribute documents to students. The teacher will arrange students in groups prior to the beginning of the lesson. These groups should be organized according to available technology. Students should keep notes on all search locations, different search engines, and weather data.

Activity 1: Searching the Internet

How can I find information about the weather on the Internet?

1. Warm-up: Students will do some exercises involving Internet terms. These can be exercises comparing Internet terms to a physical concept or those of the teacher's design.

2. Review Information Superhighway (Student Resource #1). Have a discussion of "Searching the Internet" (Student Resource #2). Students will explain how to access the Internet.

3. Given an Internet address, identify the USERNAME, HOST, SUBDOMAIN and DOMAIN.

4. Ask students to form teams of 2 or 3. Each team should logon the Internet and identify Internet access procedures.

5. Students should conduct an Internet search for weather using VA PEN, NETSCAPE and/or GOPHER. Use **Activity Sheet 1** (Student Resource #3).

Activity 2: Collecting Data

Students will work in groups to use a search engine from Activity Sheet #1 to access the high and low temperatures for a particular date (or dates) for six cities in each of six different states and record this data on **Activity Sheet 2** (Student Resource #4).

Activity 3: Computing Statistics

Using **Activity Sheet 3** (Student Resource #5), students will compute means, medians, and modes for the high and low temperatures collected in **Activity 2** and answer various questions regarding these results. Students will then draw a histogram to illustrate the high and low temperatures for the means, medians, and modes of each state.

Activity 4: BASIC Computer Program

Students discovered in **Activities 1-3** how to search the Internet for weather data and how to analyze the data using mean, median, and mode. In this activity (Student Resource #6), the student will use the weather data to construct a frequency distribution chart and write a BASIC program. The BASIC program should be constructed to accept an array composed of temperature data and print the mean, median, mode, and a frequency distribution.

Extension Problem:

The standard deviation of a list of data measures how the data is "spread out" or "scattered." Specifically, to find the standard deviation, do the following:
a. compute the mean.
b. subtract each item in the list from the mean, and square this difference.
c. sum the squared differences of (b.).
d. divide this sum by n, the number of values in the list.
e. take the square root of the quotient from (d.).

Write a BASIC program to accept the data collected in **Activity 2**, and print the standard deviation.

Evaluation:

Assessment will be based on observation of ability to access Internet, as well as, completed activity sheets.

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Information Superhighway

Today's world is becoming interconnected. This means that we can communicate daily with friends halfway around the globe. We can conduct business transactions in all the world's economies, because stock markets are linked electronically to form a huge 24 - hour-a-day business opportunity. One of the most exciting manifestations of this interconnectedness is the **Internet.**

What is the Internet?

The **Internet** is a global distribution network of people and computers, all linked together by many miles of cables and telephone lines. This global community is able to communicate because it shares a common language. Internet is constantly changing and growing. It's part of a new electronic frontier for communicating and exchanging ideas and resources.

What can I do on the Internet?

There are a variety of things that you can do on the Internet, and the list grows daily. Here are some possibilities:

- You can do legal research. The Internet allows you access to copies of state laws or US. Supreme Court Opinions.
- You can find great information and tutorials to help you do even more things on the Internet. You can track down lists of interest groups and even access entire books on using the Internet.
- You can get free public domain programs for your DOS, Windows, Macintosh, UNIX, or Amiga computer.
- You can look at pictures of the Dead Sea scrolls on file at the Library of Congress.
- You can get a weather-satellite photo of the U.S. that is, at most, thirty minutes old.
- You can get weather information from around the world, the U.S., and various resorts; Images; movies; etc.
- You can meet people around the world with interests or hobbies similar to your own--everything from home schooling of children to Lotus automobiles.

How does the Internet Work?

1. To move data between two specific computers on a network consisting of many computers, two things are required: the address of the destination and some means of safely and instantly moving the electronic signals that make up the data.

2. The Internet uses a special computer language (protocol) to guarantee the safe arrival of data at its intended destination. This language has two parts: TCP (Transmission Control Protocol) and IP (Internet Protocol). It is written as TCP/IP.

3. When an Internet user sends a block of text to another machine, TCP/IP goes to work. TCP divides that text into little data packets (packing list), adding special information so the receiving computer can make sure the packet was not damaged during transmission. IP puts a label with addressing information on this packet.

4. Consecutive TCP/IP packets traveling to the same destination may take different paths. Special machines called routers sit at the intersections of networks and decide which path is most efficient for the next step of a packet's journey. This helps regulate traffic on the Internet by distributing the load, thus avoiding an undue burden on any given part of the system.

5. When TCP/IP packets arrive at their destination, the computer removes the IP address label, uses the packing list in the TCP packet to see if any damage occurred during transmission, and reassembles the packets into the original block of text. When the receiving computer finds a damaged packet, it asks the sending computer to transmit a new copy of the bad packet.

6. Special machines called gateways allow different types of networks on the electronic frontier to talk to the Internet using TCP/IP. Gateways translate a computer network's native language into TCP/IP and vice versa.

7. The Internet appears as one giant, seamless, global network that responds almost instantly to requests.

What is an Internet Address?

Addresses are a central part of virtually everything you will do on the Internet. Any interaction you want to have with another person or machine will require an address. The IP in TCP/IP is a mechanism for providing addresses for computers on the Internet.
ex. *USERNAME@HOST.SUBDOMAIN.DOMAIN*

A. Username- the person who holds the Internet account.

B. Hosts- individual machines at a particular location. Think of a host computer as a large apartment building.

C. Host and local networks get grouped together into domains, which are themselves grouped into one or more larger domains.

Some domains correspond to organizations you will recognize, such as Stanford, NASA, or CompuServe. Sometimes an address will include more than one domain. An example of this is tynes@spacelink.msfc.nasa.gov. Spacelink is the host; msfc and nasa are both domains. In this address, msfc is like a building complex and nasa is like the town containing that complex.

D. The last part of Internet address represents the largest domain. In the United States there are six: **com** (commercial), **edu** (educational), **gov** (government), **mil** (military), **net** (network), and **org** (organization). If an address does not end in one of these six domains, it probably belongs to a country other than the United States. Examples of other countries' domain names are **ca** for Canada, **no** for Norway, and **au** for Australia.

Searching the Internet
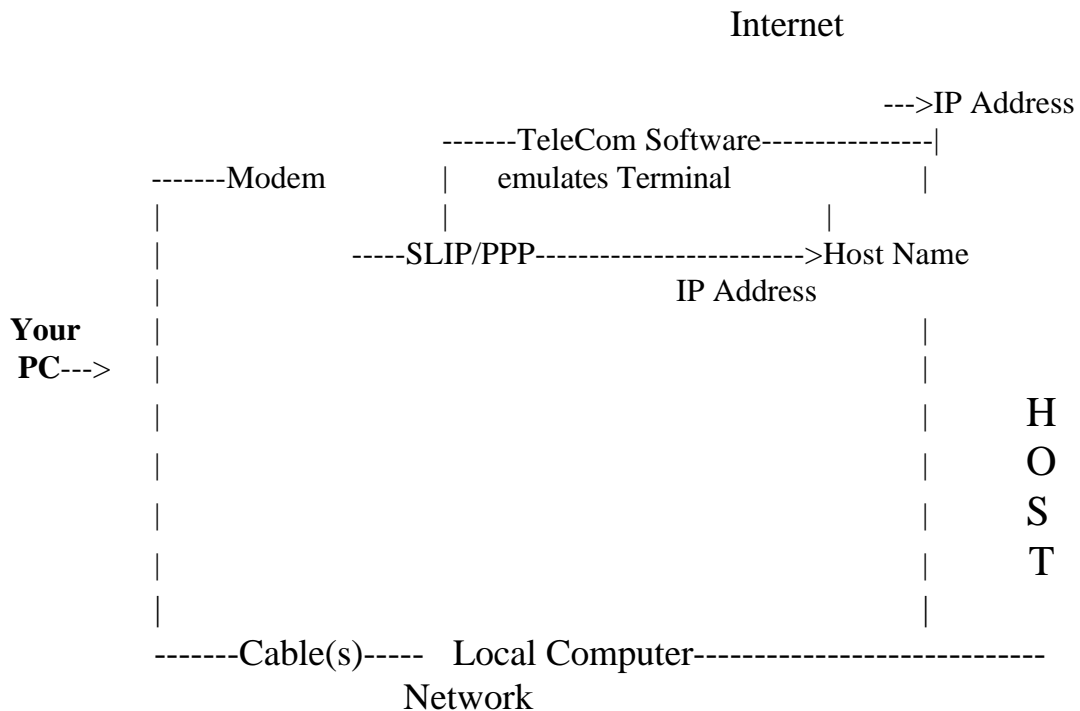
How can I find information on the Internet?

You can use one of the many available on-line **search engines**. These engines allow you to search for information in many different ways - some search titles or headers of documents, others search the documents themselves, and still others search other indexes or directories.

Some search engines are

- InfoSeek Search
- The LYCOS Home Page: Hunting WWW Information
- WebCrawler Searching
- W3 Search Engines
- CUSI (Configurable Unified Search Interface)

How can I access a search engine?

You must first connect to the Internet. Your PC needs to speak with a host machine on the Internet. (See Internet Access Road Map)

```
                                                  Internet


                                                        --->IP Address
                              -------TeleCom Software---------------|
          -------Modem        |    emulates Terminal               |
          |                   |                        |
          |            -----SLIP/PPP------------------------>Host Name
          |                        IP Address
Your      |                                                |
PC--->    |                                                |
          |                                                |          H
          |                                                |          O
          |                                                |          S
          |                                                |          T
          |                                                |
          -------Cable(s)-----  Local Computer----------------------------
                        Network
```

Now you are connected.   You can travel around the world on the information superhighway.

Sample Weather Search Locations

1. http://www.intellicast.com/weather/dca/wxdca. html
2. http://atlenv.bed.ns.doe.ca/weather/yyr.html
3. Gopher://wx.atmos.uiuc.edu
4. http://www2.infoseek.com
5. Gopher://ashpool.micro.umn.edu:70/11/Weather/
6. Gopher://downwind.sprl.umich.edu
7. http://search.yahoo.com

Weather Search Using VA PEN (WSU_____)

1. Connect to VAPEN

   From **LAN** < Telnet pen.k12.va.us> or Dialup - obtain local phone numbers from VAPEN

2. Login < Username>

3. Password < User ID code>

4. Choose menu item or type "u" for Unix prompt

5. Choose # 9 (Internet Services) from Lynx List

6. Choose #14 (Weather Service)

7. Select state code.

9. Select city code.

Weather Search Using NETSCAPE (WSU_____)

1. Connect to UMD, HUU, America OnLine, CompuServe or Prodigy, etc.
2. Follow LAN logon procedures
3. Load NETSCAPE to WWW
4. Click Netsearch to Search Engines
5. For an InfoSeek Search type <Weather> and click "Run Query"

Name_____

Date_____

ACTIVITY SHEET 1: Searching the Internet

In this activity you will explore the Internet and gain an understanding of how to get information. You will first connect to the Internet, then choose a weather search using WSU_____(VAPEN/NETSCAPE/GOPHER) to obtain weather data for the USA.

Objective: Given a weather search engine, the student will "logon" to the Internet and explore USA weather reports.

1. Construct an Internet Access road map for your PC.

2. Select a WSU___from Searching the Internet (Student Resource #2).

_____Weather Search Using VAPEN

_____Weather Search Using NETSCAPE

_____Weather Search Using GOPHER

3. Conduct an Internet Search using your PC/available technology. Follow the steps outlined within the WSU____.

4. Record your findings.
     Weather

          Source Location _____

          _____

5. Which source(s) can you use to organize high/low temperatures for a group of six cities in at most seven (7) states.

Source_____Internet Location_____

Source_____Internet Location_____

Name_____
Date_____

Activity Sheet 2:   Data Collection

Use one of the search engines described in **Activity Sheet 1** to find high and low temperatures for at most seven cities in each of six different states for a particular date.

Date for which data was collected: _____

_____
State

Cities:

Hi Low

_____ ___ ___

_____ ___ ___

_____ ___ ___

_____ ___ ___

_____ ___ ___

_____ ___ ___

_____ ___ ___

_____
State

Cities:

Hi Low

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Cities:

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Cities:

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Activity Sheet 3:   Computing Temperature Statistics

1. For the cities in each of the six states, compute the mean, median, and mode for the high and low temperatures. Round all answers to the nearest whole number.

Name of State	Mean		Median		Mode	
	Hi	Lo	Hi	Lo	Hi	Lo
_____	__	__	__	__	__	__
_____	__	__	__	__	__	__
_____	__	__	__	__	__	__
_____	__	__	__	__	__	__
_____	__	__	__	__	__	__
_____	__	__	__	__	__	__

2. Name any state in which the mean is equal to the median for either the high or the low.

3. In which state is the difference between the mean and the median greatest for the high temperature?

    Which of these, the mean or the median, seems to be a better "average" high temperature?

4. In which state is the difference between the mean and the median greatest for the low temperature?

    Which of these, the mean or the median, seems to be the better "average" low temperature?

5. Find the state with the most variation (the difference between high and low temperatures)

    in mean temperature. _____

    in mode. _____

    in median. _____

6. Draw a histogram for Problem 1.

Name_____
Date_____

Activity Sheet 4: BASIC Computer Program

In this activity, the student will use the weather information from Activities 1-3 to construct a frequency distribution chart and write a BASIC program. The BASIC program should be structured to accept an array composed of temperature data organized by states. The program should print the mean, mode, median, and a frequency distribution chart.

1. Write a math analysis.

2. Construct a flowchart/algorithm.

3. Write a BASIC program.

4. Test and debug your program on your computer system.

5. Submit your disk or hardcopy.